

July 26, 2017

MEMORANDUM

TO: The Public Service Commission
FROM: Chris Villarreal, Plugged-In Strategies
SUBJECT: Docket D2017.6.49, Minimum Information Requirements for NorthWestern's Study of Costs and Benefits of Customer Generators

PURPOSE

This memo summarizes and analyzes the comments from interested persons regarding the benefit and cost categories the Commission identified for possible inclusion in the minimum information requirements applicable to NorthWestern Energy's study of the costs and benefits of customer-generators, pursuant to HB 219. Based on the analysis, recommendations are offered for final minimum information requirements.

BACKGROUND

In April 2017, the Montana Legislature passed House Bill 219 ("HB 219"), which was signed by the Governor on May 3, 2017. HB 219 amends net metering provisions found in Title 69, Chapter 8, to require NorthWestern Energy ("NorthWestern") to conduct a study on the costs and benefits of customer-generators before April 1, 2018. NorthWestern must submit the study to the Public Service Commission ("PSC" or "Commission") as part of a general rate application. The PSC must evaluate NorthWestern's study and make findings regarding whether customer-generators should be classified separately from other customers for rate design purposes. PSC findings must relate to the system benefits of net metering and the costs of serving customer-generators. Consistent with its findings, the PSC is authorized to establish new service classifications and sub-classifications for customer-generators, establish rates for customer-generators, or establish a net billing approach whereby a customer-generator's energy production is metered separately from the customer's energy consumption and the value of energy production offsets the price of the energy consumption in the billing process. The Commission is authorized to establish the minimum information to be included in NorthWestern's study of costs and benefits.

On May 11, 2017, the PSC decided to establish minimum information requirements for NorthWestern's study. On June 16, 2017, the PSC initiated Docket No. D2017.6.49 and issued a Notice of Opportunity to Comment that identified cost and benefit categories for potential inclusion in the PSC's minimum information requirements. The Notice requested input on the identified cost and benefit categories as well as on several questions relevant to cost-benefit studies. Comments were due on July 7, 2017.

The PSC received eight sets of comments from the following interested persons: NorthWestern; Montana Consumer Counsel; Department of Environmental Quality ("DEQ"); Environment

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Exhibit 21

Montana Research and Policy Center (“Environment Montana”); Northern Plains Resource Council (“Northern Plains”); joint comments of Montana Renewable Energy Association, Renewable Northwest, Montana Environmental Information Center, Northwest Energy Coalition, and Vote Solar (“Joint Parties”); and two members of the general public.

SUMMARY OF COMMENTS

Christopher Preston

Mr. Preston proposes that “Non-Energy Benefits” include additional environmental savings, including climate change mitigation, air quality, and reduced emissions. Additionally, he recommends a 100 year time frame for consideration of benefits.

Dean Littlepage

Mr. Littlepage expresses hope for a “fair assessment of ALL” benefits to the system from NEM. He references a 2016 report from the Brookings Institution that reviewed other NEM studies and concluded that NEM provided a net benefit to customers. He notes that the Brookings paper identifies a value of solar report that credits solar for four benefits: Avoided Energy Costs, Avoided Capacity Costs, Price Certainty, and Reduced Wear and Tear. Mr. Littlepage hopes that the NEM study will rely on new methodologies and identifies the benefits from installing rooftop solar.

Department of Environmental Quality, Energy Office (DEQ)

DEQ comments that the identified list of potential costs and benefits in the notice is appropriate, but does identify two additional benefits:

- 1) Excess net metering bill credits (any amount of credits provided to the customer-generator not used means the utility did not have to pay for that amount of electricity); and,
- 2) Unclaimed BPA exchange credits (customers that reduce electricity consumption due to NEM reduce the amount of credits from BPA, those unclaimed credits are provided to other utility customers as a benefit to those customers.

DEQ also provides specific responses to the list of questions.

Q1 (Solar adoption rate): DEQ recommends using the Northwest Power and Conservation Council’s NEM growth rate (5.2% to 10.5%) or NorthWestern’s base case forecast of 8% over the 20 year planning period. If the Commission expands the types of systems to be included in the NEM study (e.g., small wind and micro-hydro systems), DEQ recommends using a flat capacity addition rate based on a 10 year average from 2006-2015.

Q2 (Timeline for costs and benefits): Based on recommendations from IREC’s Regulator’s Guidebook, costs and benefits should be evaluated over at least a 25 year period, with small wind and micro hydro systems covering a 10-15 year period. DEQ also recommends a low discount rate (3-5%) for calculation of a NEM system’s levelized costs and benefits. According to DEQ, a low

discount rate better reflects that customer generators incur high upfront costs, while costs and benefits of the NEM system will accumulate to the utility and its customers over the useful life of the system. While short-term costs and benefits should be prioritized, predictable costs and benefits over the lifetime of the system will have an impact on the overall cost effectiveness of a NEM system.

Q3 (Rate design assumptions): DEQ recommends an assumption that electric rates increase 1.8% annually over the study period. DEQ also recommends additional scenarios utilizing other rate designs commonly used by other utilities, including inverted block rates and time of use rates, as well as full revenue decoupling.

Q4 (Cost-effectiveness methodology): DEQ provides no specific recommendation, but states that the methodology should be transparent and replicable, based on available data, and capture the supply, demand, and locational attributes of NEM.

Q5 (Which SPM test): DEQ recommends use of the ratepayer impact, societal, and program administrator cost tests. DEQ recommends against solely relying upon the ratepayer impact test.

Q6 (Which marginal resource): DEQ recommends using the same methodology from Docket No. D2012.1.3 and reviewed again in Docket No. D2016.5.39, i.e., NEM would avoid a combined cycle natural gas plant and the capacity value of a natural gas fired combustion turbine.

Q7 (Locational attributes): DEQ recommends including locational attributes as location is important in determining costs and benefits. It notes that locational costs and benefits occur in the distribution system, including avoided distribution capacity costs and avoided distribution line losses. It adds that additional costs and benefits may vary by location including avoided grid support services such as voltage control and management. DEQ identifies 10 locational attributes to consider:

- Distance of net metering systems/distribution circuits from the nearest substation;
- Penetration of net metering systems on the distribution circuit and/or distribution planning area;
- Age of the feeders, voltage control equipment, transformers and other components at a particular location in a distribution planning area/circuit;
- Areas of higher than average load growth/grid expansion;
- Number of net metering systems in a distribution area with advanced inverters and potential services attributable to advanced inverters, such as reactive power supply and voltage regulation;
- Local new utility hookups and growth rates in a distribution area;
- Whether net metering systems are located on main/ring or radial distribution lines;

- How distribution feeders may or may not be aligned with the net metering generation profile in different locations;
- Circuits serving commercial/industrial customers vs. circuits serving mostly residential customers; and
- Load profile of distribution circuit (summer peaking vs. winter peaking).

Q8 (Any other compensation approaches): DEQ recommends focusing on NEM at this time to provide a baseline for future considerations of the merits of moving away from NEM. If the Commission decides to require an evaluation of additional compensation options, DEQ recommends including: 1) allocation of the full retail value to energy generated on-site and used behind the meter (treat self-generation as a conservation resource); 2) reflection of full net societal and ratepayer benefits over 25 years; and, 3) time of use rates that reflect locational value of the generating resource.

Joint Parties (MT Renewable Energy Assn., Renewable Northwest, Montana Environmental Information Center, NW Energy Coalition, and Vote Solar)

Joint Parties begin their comments with a discussion of issues that, while beyond the immediate scope of the notice, provide additional context and considerations for the review and assessment of the full NEM cost benefit study. To start, Joint Parties assert the customer's right to self-determination regarding how to consume (or not) electricity, including the installation of distributed generation. NEM is an example of this right since NEM compensates the exports from customer-generation and not the energy produced and consumed on-site. Joint Parties recommend focusing on evaluating the cost to serve customer-generators for load that is served by the utility and the compensation for energy exported by the customer-generation; they advise the Commission to avoid going behind the meter.

Additionally, Joint Parties state the Commission should not use the instant proceeding to make changes to NEM, including whether or not to create a separate customer class. Joint Parties state that any changes to NEM should be done in a rate case, and in conjunction with a full cost of service study. They then identify a set of considerations regarding the establishment of a separate classification for customer-generators. Additional information that should be collected in that effort include detailed load information to determine the relative cost to serve customer-generators. Joint Parties also note that the Commission should include other DER, such as net metered wind, hydro, energy storage, and electric vehicles in addition to solar PV.

Next, Joint Parties request that a draft of the cost-benefit study be made available for review and evaluation by interested persons, with an opportunity to submit comments. They recommend that the draft study, including all related workpapers, sources of data, and methodologies employed in the development of the study, be released by February 1, 2018, with party comments due on March 1, 2018, and a final version submitted by April 1, 2018. Joint Parties state that providing an opportunity to review and comment on the draft would provide transparency to the process and

study. Joint Parties also note that they do not interpret HB 219 to require a general rate case filing upon submission of the study. Joint Parties believe that having the study included in a rate case would delay the time frame for completion of a rate case and impose undue burden on interested parties. If the Commission disagrees with that reading, Joint Parties recommend that the study be considered as part of a separate docket outside of and prior to the submission of a rate case application. This would allow for the Commission to consider the completeness and adequacy of the study in advance of a rate case proceeding.

Regarding the minimum information requirements, Joint Parties provide both high-level and detailed comments. At a high-level, Joint Parties recommend including a broad set of categories to study. They state that categories for which information may be difficult to collect should remain in the study and that rather than attributing zero value to the category, the Commission should consider it qualitatively based on best available data. They state that barriers to obtaining necessary information should be identified and mitigated. Joint Parties recommend the IREC Regulator's Guidebook as a good place to start. Joint Parties provide additional information on the categories, noting their support for all but two of the categories; they additionally note that considerations related to interconnection is currently under consideration in another docket. They also provide a set of key factors to consider for each category. This summary does not detail all Joint Parties' comments on the categories, which are analyzed later. However, Joint Parties' comments opposing inclusion of certain categories are summarized here.

Joint Parties oppose including a Reduced Revenue cost category. Joint Parties explain that NorthWestern does not have a right to expect customers to consume at a set level; customers can reduce (or not) consumption in many different ways, including investing in energy efficiency. Additionally, they state the "reduced revenue is not a cost of serving customer-generators or one imposed by customer-generators. Should this category remain, Joint Parties recommend that reduced revenue be calculated as the volume of exports from DER systems multiplied by the retail rate credit applied under NEM, and should not include the amount of self-generated energy consumed behind the meter." Additionally, this calculation should be based on all customer classes with DER, including commercial and industrial, as excluding these customers would overstate the average cost of exports across all DER.

Regarding the Interconnection cost category, Joint Parties note that NorthWestern is in the process of updating its interconnection agreements, which may impact this category. Joint Parties caution against double counting interconnection costs in the study, as the cost-benefit study should consider only those costs that NorthWestern incurs above and beyond what is collected from the DER customer subject to potential interconnection fees.

Lastly, Joint Parties oppose the inclusion of a separate cost category on Production, Transmission, and Distribution Cost Shifts. They believe that the costs within this category will be addressed in other identified categories and through further analysis in the cost of service study during the rate case.

Joint Parties also provide specific responses to the list of questions.

Q1 (Solar adoption rate): Joint Parties note that adoption levels will significantly impact the benefits and costs of DER, but that long-term adoption rates are uncertain. Joint Parties recommend that DER costs and benefits be evaluated at penetration levels expected to occur in the next one to three years, then be revisited periodically.

Q2 (Timeline for costs and benefits): Joint Parties recommend that the levelized costs and benefits be based on the economic life of the asset. In the case of rooftop PV, that is 20-30 years.

Q3 (Rate design assumptions): Joint Parties recommend against including in the cost-benefit study potential changes to rate design over the study period. The study should be used to evaluate current policy.

Q4 (Cost-effectiveness methodology): Joint Parties support the Standard Practice Manual.

Q5 (Which SPM test): Joint Parties recommend that all the tests in the SPM be included, with a focus on the Total Resource Cost Test/Societal Cost Test and Program Administrator/Utility Cost Test.

Q6 (Which marginal resource): Joint Parties recommend use of the proxy model from the Commission's PURPA avoided cost dockets, specifically the use of combined cycle gas turbine.

Q7 (Locational attributes): Joint Parties recommend inclusion of locational attributes. However, they acknowledge that NorthWestern may lack the ability to collect the information necessary to determine locational attributes. They recommend that the Commission examine the possible need for additional data and a potential hosting capacity analysis that can identify and provide locational adders in the future.

Q8 (Any other compensation approaches): Joint Parties note that the purpose of the current study is to examine current NEM policy, as such, the Commission should focus on this effort to develop a full understanding of the current policy.

Northern Plains Resource Council

Northern Plains generally supports the categories identified in the Notice, with two exceptions. First, it states interconnection costs should be treated as a cost to the customer-generator since customers pay for their interconnection. Second, it states the revenue reduction and production, transmission, and distribution costs shift categories run the risk of double-counting the same costs to the utility. It notes that the IREC Regulator's Guidebook recommends using either lost revenue or utility costs, depending on the type of study.

Northern Plains also provides specific responses to the list of questions.

Q1 (Solar adoption rate): Northern Plains notes that while electricity from customer-generators has been growing over time, it still represents a small amount of NorthWestern's total electricity sales. Furthermore, it states that NorthWestern's energy sales have increased at a rate faster than output

from NEM. As such, Northern Plains states that it is more important to consider relative growth to total electricity load growth rather than NEM alone. Northern Plains recommends that the Commission consider NEM's impacts on other efforts, such as energy efficiency, and the sunset of the federal Investment Tax Credit. In sum, Northern Plains cautions that solar adoption, while positive, may be at a much reduced pace.

Q2 (Timeline for costs and benefits): Northern Plains recommends using either 25 years, which is the solar PV warranty, or 30 years, as recommended by IREC, and recommends a levelized benefit-cost analysis. Northern Plains notes the disconnect between utility focus on short-term costs while solar can impact the long-term, and, thus, more variable costs. It refers to the IREC guidebook which provides an example of how solar can avoid new generation or capacity.

Q3 (Rate design assumptions): Northern Plains recommends a 2.4% annual price increase assumption. Northern Plains also notes that there are subsidies in existing rate design, and that an independent finding of a material cost shift should first be identified before the Commission considers any changes to rates. Additionally, Northern Plains recommends NorthWestern consider three other rate considerations:

- 1) Time of use pricing and value of solar, and impacts on relative costs and benefits of customer generation;
- 2) Decoupling and its impacts on relative costs and benefits of NEM; and,
- 3) Changes to basic rate structures that have customers pay their fair share of the use of the distribution system and only those who purchase electricity from the utility pay for transmission.

Lastly, Northern Plains notes that reduced sales of electricity is a market risk that should be borne by the utility, and that customers have the right to reduce their grid electricity usage. Any reduction should then be borne by the utility and not be considered a cost to the utility.

Q 4-5 (Cost-effectiveness methodology, and which SPM test): Northern Plains recommends use of the Standard Practice Manual, and requiring all the tests, including societal cost test.

Q 6 (Which marginal resource): Northern Plains recommends that the Commission identify either a typical marginal generator or a blended mix of typical marginal generators.

Q 7 (Locational attributes): Northern Plains states that the Commission should not specify a locational adder because the amount of NEM is relatively low. However, Northern Plains does note that locational components are important going forward, and that even if NorthWestern does not have the data today, it can be mapped and forecasted. This information is necessary to identify the full benefits of customer generation and determination of avoided distribution system upgrades and other additional costs.

Environment Montana Research and Policy Center

Environment Montana submitted a report called “Shining Rewards” prepared by its parent organization, Environment America Research and Policy Center and the Frontier Group that was released on October 18, 2016. Generally, Environment Montana recommends the Commission include the full range of short-term and long-term benefits for distributed generation, including environmental and societal benefits, and avoided environmental and RPS compliance costs.

The report is a synthesis of 16 other NEM studies from around the country that found that NEM customers provide greater benefits to the system than they receive from NEM. The report further identified a set of grid benefits, such as avoided energy costs, reduced line losses, avoided capacity investment, reduced financial risks and electricity prices, grid resiliency, and avoided environmental compliance costs. It also identified several environmental and societal benefits, such as action on climate change, reduced public health threats, and job creation and economic development.

Montana Consumer Counsel

The Consumer Counsel notes that the schedule for the study and the Commission’s determination of minimum information requirements does not provide sufficient time to strictly define the parameters of the study. Consumer Counsel advises against adopting prescriptive minimum information requirements, but allowing NorthWestern flexibility in assumptions regarding the questions raised in the Notice. Furthermore, Consumer Counsel states that the Commission should not pre-judge disputes, and, therefore, it is premature to specify assumptions that may be contested before the Commission. For example, as noted in a footnote, Consumer Counsel notes that including and determining “Non-Energy Benefits” would be a departure from traditional cost-of-service ratemaking. The Consumer Counsel also notes that this study will be disputed, as is the normal course of business. It states that any minimum information requirements should not be regarded as a final determination of the costs and benefits that the Commission may ultimately accept in a contested case proceeding.

NorthWestern Energy

NorthWestern provides four overarching points to guide the study:

- 1) Study should focus on costs and benefits from the view of NEM customers, non-NEM customers, and NorthWestern;
- 2) NorthWestern expects solar to continue to be the dominant technology to comprise NEM, and information about other technologies will have to be supplemented by outside sources;
- 3) Focus of study should be on providing information to assist the Commission to determine, in a separate docket, a rate design that fairly allocates costs and benefits among NEM customers, non-NEM customers, and NorthWestern; however,

information from NorthWestern's next rate case will also be relevant to the rate design discussion; and,

- 4) Information and data specific to NorthWestern should be used for the study, and where data is not available, proxy information and data may be used.

NorthWestern provides specific comments on the minimum information categories. The details of those comments are analyzed below. NorthWestern opposes including the following benefits categories in the study: Avoided RPS Compliance, Market Price Suppression Effects, Avoided Risk, Avoided Grid Support Services Costs, and Avoided Outages Costs. Additionally, NorthWestern recommends including two additional cost categories: Universal System Benefits Contributions to Customer-Generator Projects and Grid Support Services to meet potential negative impacts of NEM.

NorthWestern also provides specific responses to the list of questions.

Q1 (Solar adoption rate): NorthWestern comments that an NEM adoption rate assumption is appropriate. However, it notes that adoption rates are likely to stabilize over the time of the study time frame. Additionally, it notes that adoption rates are different depending on the rate class, and it would be appropriate to consider a variety of adoption rates depending on the rate class.

Q2 (Time for costs and benefits): NorthWestern states the appropriate time frame should be determined by study developer, but believes the study time frame should be at least 20 years.

Q3 (Rate design assumptions): NorthWestern opposes prescriptive assumptions about future or alternative rate designs, and states that NorthWestern is in the best position to determine a representative rate of rate increase over time. NorthWestern also notes that the study should be considered in the next rate case to determine whether or not to create a separate rate class for NEM.

Q4-5 (Cost-effectiveness framework and which SPM test): NorthWestern does not believe that any of the identified cost effectiveness frameworks should be used. NorthWestern states those tests primarily are used to test utility programs, whereas for NEM, customers make their own cost-effectiveness determinations. NorthWestern argues that the study should focus on the perspectives of NEM customers, non-NEM customers, and NorthWestern, and the results of the study should be used to determine whether or not to create a separate rate class for NEM customers.

Q6 (Which marginal resource): NorthWestern proposes that the Commission use the decision in the QF dockets regarding marginal generation units.

Q7 (Locational attributes): NorthWestern opposes the addition of a specific locational attribute, but does recommend defining an average locational attribute for its service territory. NorthWestern notes that it has no control over the size and location of NEM, and does not have the data to evaluate the locational costs and benefits of NEM.

Q8 (Any other compensation approaches): NorthWestern interprets this question to relate to rate design, and refers to its answer to Question 3.

NorthWestern concludes its comments with a breakdown of several studies and projects related to grid modernization and NEM. In particular, NorthWestern identified:

Beck Hill Solar Battery Project: This study started in October 2015 and is collecting data on solar generation with accompanying battery storage and dispatch capability. The study will run until October 2020;

Load Research Net-Meter Study: This study started in January 2016 and is collecting data on customer-generators to analyze distribution system impacts. The study will run through December 2018;

Helena Solar-Battery Storage Project: Located at NorthWestern's Helena Division Operating Center yard, this project started in second quarter of 2015 and is intended to test the practicality of using storage for feeder support, gain experience with a small system, evaluate potential for larger scale energy storage, and answer other integration questions;

Bozeman Solar Project: This study started in November 2016 and is collecting and analyzing data related to community solar projects;

Load Research Residential Profile Study 2011-2013: This load research profiling study collected data on 300 randomly selected residential customers;

Load Research GS1 Secondary (Commercial) Profile Study 2016-2018: A commercial customer load profile study involving over 300 randomly selected customers;

Smart Grid Demonstration Project: This study was a demonstration project funded by the American Recovery and Reinvestment Act and implemented a time of use pricing pilot for 200 residential customers between October 2012 and August 2014; and,

Future Projects: A project similar to the Bozeman Solar Project will be installed in Missoula in 2018.

ANALYSIS AND RECOMMENDATIONS

This section first addresses several overarching issues related to establishing minimum information requirements. This is followed by a review of each of the benefit and cost categories included in the PSC's Notice, and an analysis of the comments the PSC received.

Recommendations are provided regarding appropriate changes to the benefit and cost categories or their descriptions.

Joint Parties recommend that a draft of the cost benefit study be released for public comment in advance of the April 1, 2018 statutory deadline. The Commission should not accept this recommendation as it would impose on NorthWestern a stricter deadline than the schedule set by

statute. Consideration of the cost benefit study will occur in the context of a subsequently-filed rate case, which will provide parties the opportunity to evaluate the study and make arguments on whether, given the results, the Commission should create a separate classification for NEM customers.

Because NorthWestern's study must be submitted to the Commission for purposes of making determinations regarding whether customer-generators should be served under separate rate classifications, the Commission should direct NorthWestern to include the study in its next general rate case application, along with prefiled testimony from a witness with direct knowledge of the study and its underlying methodologies. In addition, because the Commission's findings relative to customer-generators' cost of service must support any decision to establish a separate service classification for customer-generators, the Commission should direct NorthWestern to provide both embedded and marginal class cost of service studies in its next general rate case application. Ideally, these cost of service studies should be based on customer load profile data for net-metered and non-net-metered customers obtained in concurrent time periods. If that is not possible, NorthWestern should address the possible distortions in the cost of service study results.

Benefits Categories

Avoided Energy Costs	All avoided fuel, variable operation and maintenance, and emission allowance costs and any wheeling charges associated with the marginal unit
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NorthWestern agrees that avoided energy costs should be included in the study. It states avoided energy costs should be based on the most recent QF-1 rates set by the PSC.

Joint Parties also agree avoided energy costs should be included. They recommend using marginal costs and accounting for seasonality when identifying the marginal generator, as distributed generation exports vary throughout the year. Joint Parties add that the study should include reasonable heat rates, operations and maintenance costs, and gas price assumptions.

The "Shining Rewards" report notes that avoided energy costs are often greatest in summer months as demand rises and solar production is greatest. Adding solar reduces the need for more expensive peaker plants or peak power purchases. In both cases, relying on solar may reduce the cost to procure electricity from more expensive resources.

Recommendation:

The Joint Parties' comment to include seasonal variability is reasonable and should be reflected in a revision to the definition of Avoided Energy Costs as follows:

“All avoided fuel, variable operation and maintenance, and emission allowance costs and any wheeling charges associated with the marginal unit reflecting the seasonal variability of the NEM resource”

Avoided Capacity Costs	Deferred or displaced generation capacity costs, including costs for resources needed to maintain capacity reserve requirements
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NorthWestern agrees that avoided capacity costs should be part of the study, and the data for this category should be based on the most recent QF-1 rates sets by the PSC.

Joint Parties agree that avoided capacity costs should be part of the study. They recommend using marginal costs and an identifiable capacity value. Joint Parties state that identifying avoided capacity costs from DER requires an assessment of current and forecast capacity requirements, the marginal cost NorthWestern has assessed to build new capacity, and a measure of the contribution of DER to NorthWestern’s capacity requirements estimated by utilizing an Effective Load Carrying Capability (ELCC) method or a related methodology that approximates ELCC that considers all hours of the year.

The “Shining Rewards” report notes that electricity generated by customers reduces overall demand, which avoids or defers costs of new power plants, transmission lines, reserve capacity, and other infrastructure.

Recommendation:

The Joint Parties’ comment to use an ELCC methodology to calculate potential capacity contributions from NEM is reasonable. Additional technical discussions regarding application of an ELCC methodology to NorthWestern’s system should be addressed within NorthWestern’s Electric Technical Advisory Committee (ETAC). NorthWestern’s biannual reports pursuant to ¶ 38 of the Commission’s Comments in Docket N2015.11.91 should summarize these technical discussions.

The definition of avoided capacity costs should remain the same (“Deferred or displaced generation capacity costs, including costs for resources needed to maintain capacity reserve requirements.”), but the Commission should make the additional findings, consistent with the conclusion above: “To assess these values, NorthWestern shall conduct an Effective Load Carrying Capability assessment or other similar methodology. Additional technical discussions related to methodology, data needs, or related discussions should be addressed with the Electric Technical Advisory Committee and summarized in the biannual reports filed pursuant to ¶ 38 of the Commission’s Comments in Docket N2015.11.91.”

Avoided Transmission and Distribution Capacity Costs	The cost of deferred or displaced transmission and distribution resources needed to serve load pockets, distant generating resources, or elsewhere
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NorthWestern agrees that avoided transmission and distribution capacity costs should be included in the study. NorthWestern notes that due to the variable nature of wind and solar, and the low penetration of those resources, it has not found an opportunity to avoid such costs, to date.

Joint Parties also agree that this benefit category should be included. Joint Parties additionally note that quantifying these avoided costs should be accomplished through marginal cost studies conducted in conjunction with detailed distribution and transmission resource planning, but suspect it is unlikely such information is available for NorthWestern's system. To approximate a marginal cost study, Joint Parties recommend using the National Economic Research Associates' (NERA) Regression Method which utilizes historical costs on transmission and distribution to compare against measures of increases in demand and can then be scaled against the contribution of DER to transmission and distribution investments.

Recommendation:

Absent detailed marginal cost studies related to transmission and distribution capacity costs, it is reasonable to use NERA's Regression Method to estimate avoidable transmission and distribution capacity costs attributable to NEM. Additional technical discussions may be necessary to ensure that all relevant information and models are included to successfully accomplish determination of these costs. For example, it may be necessary to determine a methodology to measure marginal customer costs (e.g., Rental method or New Customer method).

The definition of this category should remain the same ("The cost of deferred or displaced transmission and distribution resources needed to serve load pockets, distant generating resources, or elsewhere."), but the Commission should make the additional finding, consistent with the conclusion: "Absent detailed marginal cost information from NorthWestern, the study should use the NERA Regression Analysis. Additional technical discussions related to methodology, data needs, or related issues should be addressed with the Electric Technical Advisory Committee."

Avoided System Losses	The cost of energy lost over the transmission and distribution lines to get from centralized generation resources to load
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NorthWestern agrees that this category should be included in the study. NorthWestern notes that losses are the result of many variables related to the characteristics of the lines involved, and further notes that adding customer-generation to a lightly loaded circuit may increase losses.

Joint Parties also agree that this category should be included in the study. Joint Parties state that the study should identify marginal, rather than average, line losses, and account for seasonal variability. Joint Parties note that distributed generation during peak periods offsets consumption at the source, and thereby avoids higher-than-average losses since line losses are greatest when the system is strained. Reduced consumption at the source results in less utility-delivered electricity, which reduces line losses. Joint Parties state line losses should be accounted for when calculating avoided energy, capacity, and transmission and distribution costs as 1 MW of DER can offset more than 1 MW in centralized capacity since the system is oversized to account for losses.

“Shining Rewards” identifies the role that DER can provide in reducing line losses. It notes that due to the architecture of the existing electricity system, where electricity is generated far from load, physics dictate that there is some amount of electricity lost through the transmission and distribution systems. As a result, the system is designed to generate more electricity than necessary to account for losses in delivery. Furthermore, solar’s impacts on reducing line losses during peak periods may be substantial.

Recommendation:

The Joint Parties’ comments to assess losses on a marginal basis and account for seasonal variability are reasonable.

The definition of this category should be modified as follows: “The marginal cost of energy lost over the transmission and distribution lines to get from centralized generation resources to load reflecting the seasonal variability of the NEM resource.”

Avoided RPS Compliance Costs	Avoided costs for compliance with Montana’s renewable energy standards
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NorthWestern opposes the inclusion of this category, noting that although it has data related to this category, it is projected to be compliant with its RPS through 2042 and costs for existing RPS projects are fixed by contract.

Joint Parties agree that this category should be included in the study. Joint Parties note that DER generation reduces NorthWestern’s RPS compliance requirement. They state the value of avoided RPS can be based on the premium paid for eligible renewable energy resources, as shown by the price of RECs in the market. Additionally, since DER reduces the amount of renewables NorthWestern needs to procure, NorthWestern will have the ability to sell excess credits; therefore, Joint Parties state that the status of NorthWestern’s current RPS compliance or REC procurement does not matter.

Recommendation:

It is reasonable to include this category in the study. As Joint Parties note, DER may reduce NorthWestern's RPS compliance and provide NorthWestern with options for reselling excess RECs. Including the category in the minimum information requirements does not necessarily mean a material avoided cost exists, but requires NorthWestern to assess it as a potential source of avoided costs. Recommend no change to the definition.

Avoided Environmental Compliance Costs	Avoided costs associated with marginal unit compliance with various existing and commonly expected environmental regulations, including potential CO2 regulations
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NorthWestern agrees that this category could be in the study, but states that avoided carbon-related costs should be excluded, consistent with recent PSC decisions in QF dockets.

Joint Parties agree this category should be included in the study. Joint Parties note that DER reduces the amount of criteria pollutants produced by fossil resources, including NO_x, SO_x, and other particulate matter. Additionally, the avoided operating expenses should be valued to the extent they are not already captured in the Avoided Energy Cost and Avoided RPS Compliance Cost, based on the emission rate of the identified marginal resource.

Recommendation:

It is reasonable to include this category in the study. As stated with respect to the avoided RPS compliance cost category, including the category in the minimum information requirements does not necessarily mean a material avoided cost exists, but requires NorthWestern to assess it as a potential source of avoided costs. The Commission may consider requiring two scenarios, one with CO₂ and one without. Recommend no changes to the definition.

Market Price Suppression Effects (Fuel Hedging)	Price effect caused by the addition of new supply on energy and capacity markets
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NorthWestern opposes including this category in the study. NorthWestern notes that it is a price taker in the market, and its load has little to no influence on market prices. Furthermore, it states that small reductions in load will not affect prices at the regional level or the local level for natural gas and electricity.

Joint Parties agree that this category should be included in the study, but note that this benefit may be difficult to measure in the Montana regulatory model. However, Joint Parties provide a

methodology to model this category by analyzing what market prices would have been with and without DER, then multiplying the change in price by the volume of DER generation.

Recommendation

It is reasonable to include this category in the study, but the Commission should recognize that the characteristics of NorthWestern's system and the low penetration of DER may present barriers to obtaining a meaningful result. Again, including the category in the minimum information requirements does not necessarily mean a material avoided cost exists, but requires NorthWestern to assess it as a potential source of avoided costs. Recommend no change to the definition.

Avoided Risk (e.g., reduced price volatility)	Reduction in risk associated with price volatility and/or project development risk
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NorthWestern is uncertain about whether this category should be included in the study. It notes that reducing load will reduce the amount of energy it will need to purchase, but intermittent resources may also increase volatility which may require NorthWestern to purchase energy. Additionally, due to the low amounts of NEM, NorthWestern is unlikely to offset project development risk from DER since NorthWestern has an obligation to serve load.

Joint Parties agree this category should be included in the study. They note that DER exports reduce reliance on fuels with volatile and uncertain market prices. Reducing this risk premium is a benefit that can be quantified as the cost to remove natural gas uncertainty for the given volume of DER generation. Joint Parties state that NorthWestern has a relatively high exposure to market prices, which may result in a significant value stream to capture.

The "Shining Rewards" report notes that since DER may not incur fuel costs, the utility may experience less risk from fuel price volatility. Additionally, it notes that to manage such risks, utilities engage in other practices to lock in forward contracts, at a premium. The report also identifies benefits from DER related to lower electricity prices from reduced overall demand, i.e., the utility not only purchases less electricity, the price of electricity is also less.

Recommendation:

It is reasonable to include this category in the study. Since the study will cover a 20-plus-year time frame, there will likely be some long-term savings from NEM at whatever adoption rate. Again, including the category in the minimum information requirements does not necessarily mean a material avoided cost exists, but requires NorthWestern to assess it as a potential source of avoided costs. Recommend no changes to the definition.

Avoided Grid Support Services Costs	Reduced or deferred costs for grid support (aka ancillary) services including voltage control and reactive supply
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NorthWestern opposes including this category in the study, asserting that NEM does not avoid grid support services requirements. Rather, NorthWestern states that NEM may increase costs as NorthWestern may need to purchase additional operational reserves and other ancillary services to respond to the variable nature of NEM resources.

Joint Parties agree this category should be included in the study. They note that DER resources can provide ancillary services to the grid, including VAR regulation and voltage pass-through. However, the ability to provide those services depends on a policy requiring advanced inverter functionality. They note that such policies exist in Hawaii and California. Joint Parties recommend that the study assume the full use of available inverter functionality and not limit the assessment of NEM's ability to provide these services based on previously-installed technology.

Recommendation

It is reasonable to include this category in the study. NorthWestern has stated that it will be submitting revisions to its interconnection tariffs, in which case, it should include expected revisions allowing use of advanced inverter functionality. Final revised standards in IEEE 1547 are expected early next year which will allow for certain advanced inverter functions. Additionally, revisions to UL 1741 were finalized last year and UL is certifying advanced inverters to its standard. Lastly, since this is expected to look at a 20+ year time frame, it is very reasonable to expect that advanced inverter functionality will be used. Recommend no changes to the definition.

Avoided Outages Costs	Reduced costs associated with avoided power interruptions attributed to the ability of net metered systems to operate during outages. For example, Value of Lost Load.
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NorthWestern opposes including this category, stating that currently it does not allow NEM resources to energize or back-feed onto the utility system during outages as a safety precaution. Therefore, NorthWestern argues that there are no avoided outages costs.

Joint Parties agree this category should be included. They state that DER can increase the resilience of the grid by decreasing load requirements on constrained circuits, and, in conjunction with energy storage, allow customers to use electricity on site.

The "Shining Rewards" report notes that DER enhances grid resilience by decentralizing the grid, which may allow certain areas on the system to ride-through certain system events. It also identifies the potential role for advanced inverters to allow solar and storage to be safely integrated into the grid.

Recommendation:

It is reasonable to include this category in the study. Again, NorthWestern has stated it plans to update its interconnection tariff. With the expected finalization of IEEE 1547 to allow for advanced inverters, NorthWestern's argument goes away, provided NorthWestern includes it in its interconnection revision. It is unreasonable to assume that advanced inverter functionality will not be allowed at some point in the next 20 years. Recommend no changes to the definition.

Non-Energy Benefits	Includes a wide range of benefits not associated with energy delivery such as increased customer satisfaction and fewer service complaints.
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NorthWestern agrees this category should be included in the study. However, NorthWestern notes that there are few, if any, non-energy benefits. Rather, NorthWestern states NEM customers impose additional administrative costs.

Christopher Preston provides comments related to the many environmental and non-energy benefits related to investment in DER.

Joint Parties agree this category should be included in the study. Joint Parties identify three primary non-energy benefits: 1) local economic benefits, including increased tax revenue and job creation; 2) reduced water usage; and 3) public health benefits from decreased airborne pollutants.

The "Shining Rewards" report provides several examples of non-energy benefits, including addressing climate change, reducing public health threats, and creating jobs and economic development.

The Montana Consumer Counsel notes that identifying and quantifying non-energy benefits would represent a departure from traditional cost of service ratemaking. It further comments that non-energy benefits are not included in the consideration of a new gas plant, and should be treated similarly for NEM.

Recommendation

It is reasonable to include this category in the study. Recommend no changes to the definition.

Cost Categories

Reduced Revenue	Lost utility revenue associated with reduced sales due to net metering.
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NorthWestern agrees that this cost category should be included in in the study.

Joint Parties oppose including this category in the study. Joint Parties note that utilities have no right to expect customers to consume electricity at a set level, and customers may take many actions that reduce their consumption, such as energy efficiency investments. Additionally, Joint Parties argue that reduced revenue from load reduction is not a cost of that customer. However, should the Commission include this category, Joint Parties recommend the value be calculated as the volume of exports from DER systems multiplied by the retail rate credit applied under NEM, and should not include the amount of self-generated energy consumed behind the meter. Additionally, the analysis should consider all rate classes, including commercial and industrial.

Northern Plains cautions that including reduced revenue and production, transmission, and distribution cost shifts risks double counting the same cost. Northern Plains recommends using either reduced revenue or utility costs to serve a NEM customer. Northern Plains also notes that loss of power sales is a market risk that should be borne by the utility as customers can reduce their consumption and any reduction should be considered a cost to the utility.

Recommendation:

Joint Parties and Northern Plains are correct that customers are free to change their consumption patterns and reduced revenue from NEM is not a customer cost, in the traditional utility cost of service sense.

However, multiple parties, including Joint Parties, recommend applying a variety of Standard Practice Manual tests, including the RIM. It is not possible to perform a RIM test without accounting for reduced revenue, which represents fixed utility costs that may be recoverable on an ongoing basis from ratepayers. On the other hand, including a separate category for Production, Transmission, and Distribution Cost Shifts does pose a risk of double counting. Because lost/reduced revenue is consistent with terminology in the Standard Practice Manual, and because the existence/extent of cost shifting will be addressed in the rate case process, the Commission should eliminate the Production, Transmission, and Distribution Cost Shifts cost category from the minimum information requirements. Additionally, the Commission should not opine, in the minimum information requirements, on NorthWestern's rights to recover costs or earn revenue; those matters will be addressed in rate cases.

Administrative Costs	Costs incurred to administer net metering, including, for example, marketing, advertising, evaluation, market research, and basic administration
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NorthWestern agrees that this category should be included in the study.

Joint Parties also agree that certain direct administrative costs to implement NEM should be included in the study. These consist of one-time costs associated with setting up and verifying applications and on-going program administration expenses. Joint Parties recommend excluding

marketing, advertising, and market research costs as those are not direct costs required to support customer-generators.

Recommendation:

It is reasonable to include this category in the study. Recommend no changes to the definition.

Interconnection	Costs incurred to interconnect customer-generators (can apply to both utility and NEM)
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NorthWestern agrees this should be included as a category in the study. NorthWestern comments that it can provide estimated costs to interconnect from both the utility and customer-generator perspective. Separately, NorthWestern has noted that it plans to submit a revision to its interconnection tariff, including a proposal to charge an interconnection fee.

Joint Parties agree that this should be included as a category in the study. Joint Parties note, however, that NorthWestern is expected to revise its interconnection process and may include an interconnection fee, therefore, Joint Parties state that this category should include only those costs not recovered from the customer in the interconnection process.

Northern Plains notes that under NorthWestern's current interconnection process, the customer-generator is responsible for any distribution or metering system modifications resulting from the installation and interconnection of the customer's generator. Northern Plains states that those costs should be considered customer costs.

Recommendation:

It is reasonable to include this category in the study. Recommend no change to the definition.

For the time being, NEM customers pay no administrative fee to interconnect, however, they are responsible for any distribution upgrades necessary to interconnect. As noted in the definition, interconnection costs can fall on both the utility and the customer-generator. For purposes of the study, interconnection costs should be split between utility costs and customer-generator costs. Since NorthWestern does not charge for interconnection, there is no risk of double counting the utility costs at this time, however, for future years, the study should include an administrative fee scenario to mitigate the risks of double counting.

Integration	Costs incurred to incorporate customer generation into the grid
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NorthWestern agrees this category should be in the study. NorthWestern states that it incurs additional costs associated with increased ancillary services it procures to integrate resources into

the grid. While it currently does not have information on these costs, NorthWestern will work to collect information on these costs.

Joint Parties state that given the current low penetration of DER in Montana, it is unlikely NorthWestern incurs any costs associated with integrating DER. Joint Parties note that this category could be recognized as a potential future issue, but state that it would be pre-mature to give this category much weight given long-term penetration forecasts.

Recommendation:

It is reasonable to include this category in the study. Recommend no changes to the definition.

Given low penetration of DER in Montana, collecting this information is important for both the near-term consideration and for identifying real costs over time. The Commission should recognize that these costs may vary substantially over time.

Production, Transmission, and Distribution Cost Shifts	Costs associated with providing production, transmission and distribution services to customer-generators that exceed revenue from customer-generators under existing rate structures
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NorthWestern agrees that quantifying the cost shifts is necessary for the Commission to determine whether to create a separate rate category for NEM customers. However, NorthWestern recommends against including this category in the study because NorthWestern interprets this question as requiring an allocated cost of service study, which will not be available until NorthWestern's next rate case.

Joint Parties agree that identifying any cost shifts between customers is an important consideration, however, they note that a separate cost of service study is necessary to consider this topic. Joint Parties state that whether and to what extent a cost shift may or may not occur will depend on the balance of the identified benefits and costs.

Northern Plains notes that the categories of "Reduced Revenue" and "Production, Transmission, and Distribution Cost Shifts" poses the risk of double counting the same utility costs. Northern Plains quotes the IREC Regulators Guidebook that states regulators should choose between a determination of lost revenue or utility costs.

Recommendation:

This category in combination with the Reduced Revenue poses a double counting risk and should be eliminated. The magnitude of any cost shifting and whether and how to mitigate it will be addressed in a future rate case. Upon completion of a cost of service study in the rate case, and together with the results of the cost-benefits study, the Commission will be in a position to decide

whether to create a separate NEM rate class. At this time, reduced revenue appears to be the more appropriate metric for this initial cost benefit study.

Other Recommendations from Parties

NorthWestern proposes to include two additional cost categories:

- 1) Universal System Benefits Contributions to Customer-Generator Projects: NorthWestern states that all its customers pay into this fund which provides incentives for NEM.
- 2) Grid Support Service: This cost relates to increased costs for grid support services to integrate NEM, such as voltage control and reactive supply.

Recommendation:

Do not include these cost categories.

DEQ proposes to include two additional benefits categories:

- 1) Excess net metering bill credits: DEQ notes that NEM credits unused after 12 months are given back to the utility without any compensation. DEQ states that those unused credits represent energy the utility received from the customer-generator but did not have to purchase or generate, and should be counted as a benefit to other utility customers.
- 2) Unclaimed BPA exchange credits: DEQ states that BPA's Residential Exchange Program provides payments to NorthWestern reflecting benefits of the Federal Columbia River Power System. Those payment are then passed on to residential and small farm utility customers in the form of a bill credit. Customers that reduce purchases of energy from NorthWestern via NEM also receive less BPA credits, which results in unclaimed credits. Those credits are rolled over to other customers, and DEQ recommends including that as a benefit to other customers who receive BPA credits.

Recommendation:

Do not include these benefit categories.

The above recommendations are summarized in Attachment 1, which is a revised table of the benefits and costs categories included in the Commission's June 16, 2017, Notice of Opportunity to Comment.

Additional Questions Regarding Benefit-Cost Studies

1. What, if any, assumptions regarding the adoption rate of solar or other net metering technologies should the Commission specify?

The comments of the parties all support either a moderate increase in solar adoption over time, or a minimal increase over time. Based on other NEM cost benefit studies, this would be a basic assumption that would guide costs and benefits over the study's time frame.

For purposes of this study, at least three scenarios seem appropriate in order to assess a wide-range of possible outcomes. In this instance, low, middle, and high adoption rates would be reasonable. Using DEQ's recommendation, which is based on NorthWestern's own base case forecast, a middle case scenario would be 8% over 20 years; a low case could be set close to 3-4%; and, a high case could be set close to 12%.

The Commission could also take two other options

- a) Decline to set a rate of adoption scenario, or
- b) Send the setting of rate of adoption scenario to the technical working group.

2. What, if any, time frame for calculating benefits and costs should the Commission specify (e.g., 10 years, 20 years, etc.)?

The comments of the parties all recommended at least 20 years for the time frame of the study. Based on the comments, a time frame of 25 years is reasonable. As Northern Plains notes, 25 years is the typical length of a warranty for a solar installation. Additionally, all costs and benefits should be levelized as costs and benefits may be lumpy over time, with costs increasing in the short-term and benefits realized over a longer-term.

The Commission may also choose whether to include wind and micro-hydro, which are resources also subject to NEM. Should the Commission decide to include these resources, a shorter time period seems reasonable. DEQ recommends 10-15 years as an expected life span for these resources. Should the Commission to not include these resources, then no additional action is necessary.

3. What, if any, assumptions regarding utility rates should the Commission specify (e.g., rate of increase, changes in rate design (time-of-use, other))?

NorthWestern and Joint Parties recommend against specifying an assumptions regarding rate design. DEQ and Northern Plains recommend specifying an assumption regarding rate changes over time. DEQ recommended a 1.8% annual increase, and Northern Plains recommended 2.4%. DEQ and Northern Plains also recommended specifying scenarios based on alternative rate designs, such as time of use pricing, value of solar, and full revenue decoupling.

Assumptions regarding the rate a customer is avoiding is a component of studies analyzing costs and benefits, as this is a metric that may impact solar adoption. Adopting either recommendation of DEQ or Northern Plains would be reasonable. Alternatively, should the Commission decide that

rate design introduces too many variables, and consider this initial cost benefit study as a base case study, keeping rates static would simplify the analysis. Lastly, the Commission could also adopt a base rate of average inflation based on the prior 10 years, and apply that going forward. In this case, the average rate of inflation since 2007 is 1.8%, which is the same recommendation from DEQ.

(Data generated from <http://www.usinflationcalculator.com/>)

4. What, if any, methodology for cost-effectiveness tests should the Commission specify (e.g., Standard Practice Manual or the Cost Benefit Framework developed by the Electric Power Research Institute)?

With the exception of NorthWestern, the comments of the parties that addressed this question all recommended the use of the Standard Practice Manual. NorthWestern argued that Standard Practice Manual tests apply to utility programs, whereas customers make their own calculations regarding cost-effectiveness of NEM.

Since this study is to determine the costs and benefits of NEM on the NorthWestern system, adoption of a cost-effectiveness test is reasonable. Furthermore, a cost-effectiveness test provides a transparent, replicable, and standards-based approach to doing a cost-effectiveness methodology. Utilization of a cost-effectiveness methodology for NEM studies is typical across the NEM studies reviewed for this proceeding. Additionally, the NARUC DER Compensation and Rate Design manual also identified the use of a cost-effectiveness methodology as a means to identify, understand, and measure the costs and benefits of DER.

Other than NorthWestern, parties agreed on the use of the Standard Practice Manual as the means to measure the costs and benefits of NEM. It is reasonable to adopt the Standard Practice Manual as the source of the methodology for cost-effectiveness of NEM.

5. What cost-effectiveness perspective(s) should the Commission require be evaluated (e.g., societal, utility/program administrator, ratepayer, participant)?

The perspectives identified in the question all relate to several tests that are included in the Standard Practice Manual. Each test includes a variety of assumptions, parties, perspectives, and inputs. For example, the Utility Cost Test considers the impact of a resource only on utility costs. In other words, if a customer invests in a solar PV resource, the dollars invested by the customer are not included in this test since the utility did not spend any money. As another example, the Ratepayer Impact Methodology would look at how investment resource impacts ratepayers generally.

The parties, other than NorthWestern, recommended that all the tests in the Standard Practice Manual be utilized, including the Societal Cost Test.

The Commission can choose to require the use of all the tests, including the Societal Cost Test, or require a subset of the tests. DEQ noted that the Commission should not rely solely on the Ratepayer Impact Methodology. Joint Parties recommend that the Commission focus on the Utility/Program Administrator Cost Test or Total Resource Cost/Societal Cost Test. Utilization of all the tests would not be unusual for a NEM costs and benefit analysis, and it would also give the Commission the broadest data set from which to utilize.

At a minimum, the Commission should direct NorthWestern to perform a Utility/Program Administrator Cost Test. Given parties' interest in seeing the outcomes of other Standard Practice Manual tests, there would need to be a certain set of minimum information sufficient to conduct any of the tests, should the Commission require utilization of all the Standard Practice Manual tests. That would require reconsidering the Commission's prior decision to exclude the resource costs category, since the Total Resource Cost/Societal Cost tests require those costs.

Generally, requiring minimum information sufficient to conduct all of the Standard Practice Manual tests would: 1) accommodate the comments of the parties; 2) follow the practices of NEM studies performed by other regulatory commissions; 3) perhaps err on the side of requiring more information than ultimately needed, but avoid the risk of finding out too late that insufficient information was required, and 4) preserve the Commission's ability to narrow the focus of the benefit-cost study in the rate case, if appropriate.

Unless NorthWestern chooses to apply the other Standard Practice Manual tests, if the Commission uses only the Utility/Program Administrator Cost Test, the net benefits shown by that single test will be considered along with the cost of serving customer-generators developed in the rate case to determine whether customer-generators should be classified separately for purposes of setting rates. In other words, based on a comparison of the net benefits of NEM energy, determined in the April 1, 2018 cost-benefit analysis, and the long-run marginal cost of service, determined in the subsequent rate case, the Commission will need to decide whether a separate rate classification should be established for customer-generators.

6. Should the Commission specify the generating resource avoided by net-metered systems?
If so, what generating unit should be used?

The comments of the Parties were in near universal agreement that this value should be based on the Commission's determination in the PURPA QF dockets. This would be a reasonable determination.

7. Should the Commission specify a particular locational attribute that counts as either a benefit or cost adder/subtractor?

The costs and benefits of NEM (and DER generally) are location specific. This is an important component of understanding the costs and benefits of NEM over time. A solar resource located on

a constrained circuit imposes a different cost than one on circuit with plenty of capacity. All parties recognize this situation. For example, NorthWestern notes that it may have to increase its purchase of certain ancillary services at points across its system to maintain reliability; DEQ, on the other hand, notes that advanced technology located at the resource can be utilized by the utility to avoid purchase of ancillary services or avoid construction of new capacity. Additionally, DEQ identifies 10 attributes to consider when determining locational attributes. Joint Parties note that while locational impacts are important, NorthWestern may not have the capability to measure them.

The lack of data is one of the major factors across the country in being able to adequately capture the full costs and benefits of DER. Without being able to account for these costs and benefits, a cost study will have left a substantial part of the system unaccounted for in its methodology. As noted in the NARUC DER manual, a key first step in understanding the impacts of DER on a utility's system is knowing what is on one's system. In other words, a utility must have the technology available to measure and communicate with the end points on its system to have visibility, awareness, and understanding of its system.

Parties seem to agree that NorthWestern does not have the capability to provide information about its system to support locational cost and benefit information. However, the Commission should recognize that location of NEM is important, and that it should be considered in the study. Determinations of how to consider locational costs and benefits should be discussed by the technical working group as there may be models in use in other states that could approximate locational impacts.

8. What, if any, other compensation approaches in addition to net metering should be assessed in the study NorthWestern is required to conduct?

Parties did not express much interest in considering alternative means of compensating solar PV. NorthWestern, Joint Parties, and DEQ all note that the purpose of the cost and benefit study is to understand current considerations and form a baseline methodology for any potential future action. It is reasonable to limit consideration to the current NEM situation.

Benefits

Avoided Energy Costs	All avoided fuel, variable operation and maintenance, and emission allowance costs and any wheeling charges associated with the marginal unit <u>reflecting the seasonal variability of the NEM resource</u>
Avoided Capacity Costs	Deferred or displaced generation capacity costs, including costs for resources needed to maintain capacity reserve requirements.
Avoided Transmission and Distribution Capacity Costs	The cost of deferred or displaced transmission and distribution resources needed to serve load pockets, distant generating resources, or elsewhere
Avoided System Losses	The <u>marginal</u> cost of energy lost over the transmission and distribution lines to get from centralized generation resources to load <u>reflecting the seasonal variability of the NEM resource</u> .
Avoided RPS Compliance Costs	Avoided costs for compliance with Montana's renewable energy standards
Avoided Environmental Compliance Costs	Avoided costs associated with marginal unit compliance with various existing and commonly expected environmental regulations, including potential CO2 regulations
Market Price Suppression Effects (Fuel Hedging)	Price effect caused by the addition of new supply on energy and capacity markets
Avoided Risk (e.g., reduced price volatility)	Reduction in risk associated with price volatility and/or project development risk
Avoided Grid Support Services Costs	Reduced or deferred costs for grid support (aka ancillary) services including voltage control and reactive supply
Avoided Outages Costs	Reduced costs associated with avoided power interruptions attributed to the ability of net metered systems to operate during outages. For example, Value of Lost Load.
Non-Energy Benefits	Includes a wide range of benefits not associated with energy delivery such as increased customer satisfaction and fewer service complaints.

Costs

Reduced Revenue	Lost utility revenue associated with reduced sales due to net metering.
Administrative Costs	Costs incurred to administer net metering, including, for example, marketing, advertising, evaluation, market research, and basic administration
Interconnection	Costs incurred to interconnect customer-generators (can apply to both utility and NEM)
Integration	Costs incurred to incorporate customer generation into the grid